BMP #48 - Dry Extended Detention Pond

Targeted Pollutants

45% Sediment

25% Phosphorus

Trace metals

Bacteria

Petroleum hydrocarbons

Physical Limits

Drainage area 10-50 ac

Max slope 10%

Min bedrock depth 6 ft

Min water table 4 ft

SCS soil type ABC

Freeze/Thaw good

Drainage/Flood control yes

DESCRIPTION

An Extended Detention Dry Pond is designed to drain completely between storm events. This allows it to detain runoff a bit longer than a regular detention pond and provides some treatment for water quality. Its benefits are chiefly in its moderating influence on peak flows helping to control streambank erosion.

APPLICATION AND LIMITATIONS

Dry extended detention ponds require careful planning in order to function correctly. Of critical importance is prediction of flow volumes and the design of an outlet structure to drain slowly enough to provide some water quality benefits but rapidly enough to be empty for the next storm. Since it drains completely between storms, the first flush of the next storm tends to resuspend sediments deposited during the last.

Dry ponds often serve multiple purposes. In addition to flood control and water quality benefits, the pond may be used for recreation, such as a playground or picnic area, when dry. Thus, aesthetic considerations are important in siting dry ponds. Use of good landscaping principles is encouraged. The planting and preservation of desirable trees and other vegetation should be an integral part of the storage facility design.

The design of urban detention facilities should be coordinated with a basin plan for managing stormwater runoff. In a localized situation, an individual property owner can, of course, by his or her actions alone, provide effective assistance to the next owner downstream if no other areas contribute to that owner's problems. However, uncontrolled proliferation of impoundments within a watershed can severely alter natural flow conditions, causing compounded flow peaks or increased flow duration which can contribute to downstream degradation. In addition, upstream impacts due to future land use changes should be considered when designing the structure. Land use planning and regulation may be necessary to preserve the intended function of the impoundment.

DESIGN PARAMETERS

Site Constraints

Constraints are similar to wet ponds. Since the dry pond does not permanently store a pool of water, it has some potential for locations that are inappropriate for wet ponds. However, a geotechnical report should be completed if any restrictions are to be relaxed, especially if a high infiltration rate is expected.

Pool Volume

The permanent pool volume should be equal to the runoff volume of 1/3 of the 2-year, 24-hour design storm. Review Appendix G-2 for additional information on sizing the detention facility.

Overflows

Detention facility design must take into consideration the possibility of overflows. An overflow device must be installed in all facilities to bypass flows over or around the restrictor system. The most common overflow event is during snowmelt, but overflows may also result from higher intensity or longer duration storms than the design storm or result from plugged orifices or inadequate storage due to sediment buildup in the facility.

Pond Configuration And Geometry

Dry ponds are normally single-celled. The total pond area and volume should be consistent with the sizing criteria given in Appendix G-2.

Long, narrow ponds are preferred, as these are less prone to short-circuiting and tend to maximize available treatment area. The length-to-width ratio should be at least 3:1 and preferably 5:1. The inlet and outlet should be at opposite ends of the pond where feasible. If this is not possible, then berms can be installed to increase the flow path and water residence time. Slightly irregular ponds may perform more effectively and will have a more natural appearance.

Interior side slopes should be no steeper than 3H:1V. Exterior embankment slopes should be 2H:1V or less.

The pond bottom should have a 2% slope to allow complete drainage. A low flow channel should run from inlet to outlet as well.

Infiltration

The dry pond is the only detention BMPs where infiltration is often desired. Unless there is a large potential for groundwater contamination, an impervious liner is usually not required.

Berm Embankment/Slope Stabilization

Pond embankments higher than 6 feet should require design by a geotechnical-civil engineer licensed in the state of Idaho. For berm embankments of 6 feet or less (including 1 foot freeboard), the minimum top width should be 6 feet or as recommended by the geotechnical-civil engineer.

Pond berm embankments must be constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a geotechnical report) free of loose surface soil materials, roots and other organic debris.

Exposed earth on the side slopes and bottom should be sodded or seeded with the appropriate seed mixture as soon as is practicable (see BMP #35-Seeding and #36- Sodding). If necessary, geotextile or matting (BMP #13 and #14) may be used to stabilize slopes while seeding and sodding become established.

CONSTRUCTION GUIDELINES

Widely acceptable construction standards and specifications such as those developed by the USDA - Soil Conservation Service (SCS) or the U.S. Army Corps of Engineers for embankment ponds and reservoirs

may aid in building the impoundment. Additional information is also available from the Idaho Transportation Department's Design manual.

MAINTENANCE

Failure of large impoundment structures can cause significant property damage and even loss of life. Such structures should be designed only by professional engineers registered in the state of Idaho who are qualified and experienced in impoundment design. Where they exist, local safety standards for impoundment design should be followed. Impoundment structures should also be regularly inspected for signs of failure, such as seepage or cracks in the berm.

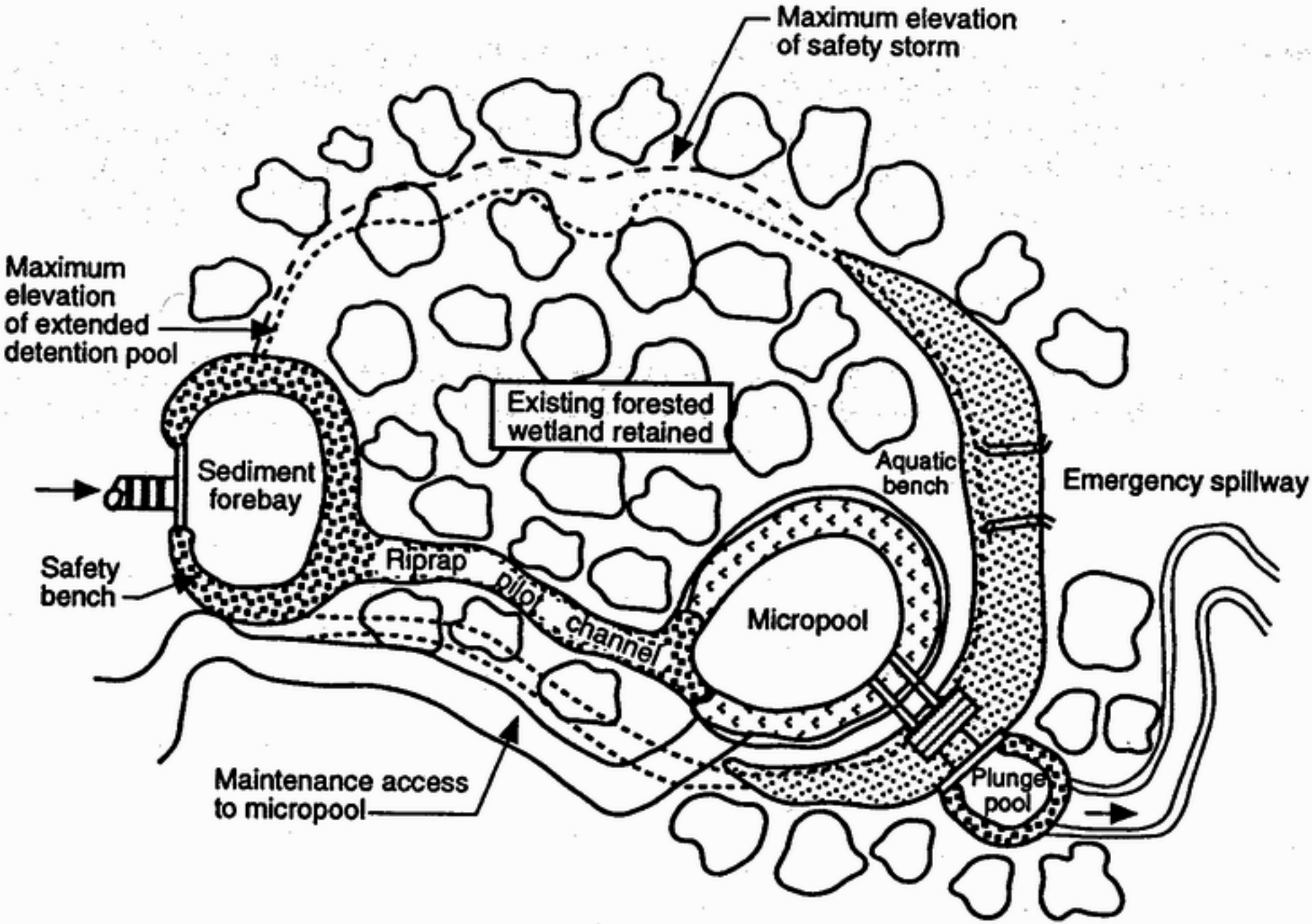
If used for recreational purposes between rain events, the dry pond will require regular maintenance, such as mowing. Activities involving intense use resulting in bare soil, such as soccer fields should be discouraged. Any exposed soil should be promptly revegetated with sod or seed.

Safety, Signage And Fencing

Ponds which are readily accessible to populated areas should incorporate all possible safety precautions. Steep side slopes (steeper than 3H:1V) at the perimeter should be avoided and dangerous outlet facilities should be protected by enclosure. Warning signs should be used wherever appropriate. In the case of dry ponds, posted signs may help prevent calls about the flooded playground. Signs should be placed so that at least one is clearly visible and legible from all adjacent streets, sidewalks or paths.

Heavy Metal Contamination

Dry ponds are less likely to build up excessive levels of heavy metals from sediments washed off impervious areas than wet ponds. Routine maintenance should remove any significant sediment deposits.


Maximum elevation of safety storm
Maximum elevation of extended detention pool
Existing forested wetland retained
Sediment forebay
Aquatic bench
Emergency spillway
Safety bench
Riprap
Pilot channel
Micropool
Maintenance access to micropool
Plunge pool